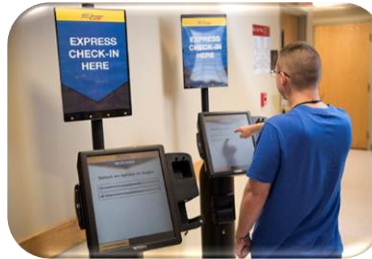
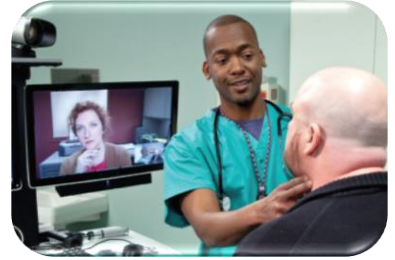




VA

**U.S. Department
of Veterans Affairs**

Veterans Health
Administration



Veterans Health Administration

Health Information Strategic Plan

Fiscal Year 2022 – 2026

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1 INTRODUCTION

1.1 PURPOSE

The Veterans Health Administration (VHA) Health Information Strategic Plan (HISP) defines the strategic direction for health information technology (HIT) within VHA and informs information technology (IT) strategic planning and investment decisions to best meet VHA and Veteran needs. HIT enables VHA to capture and share clinical data and implement advanced clinical processes to realize improved clinical outcomes. The VHA HISP also informs the approach followed by the VHA Governance Board (GB) IT Committee (ITC) as it aligns and prioritizes VHA IT investments with VHA business strategies and leads development of business requirements for IT solutions. This enables VHA's clinical and business leaders to articulate and meet strategic and tactical objectives. In turn, the VHA Office of Health Informatics (OHI) works with leaders, subject matter experts, and the IT governance community to define the interconnectivity and characteristics of the various IT programs that are required to achieve strategic objectives. VHA OHI also identifies interdependent business requirements to help ensure interoperable IT capabilities in support of workflows that transcend individual work units.

Although written as a separate document, the VHA HISP is best understood when taken in context with the overarching [Department of Veterans Affairs \(VA\) Strategic Plan](#), [Operations Plans for VHA Program Offices and Veterans Integrated Service Networks \(VISNs\)](#), [VHA Long Range Planning Framework](#), and [VHA Modernization: Continuing the Journey 2021](#). It is designed to inform other strategic documents, such as the VA IT Strategic Plan and VA Enterprise Roadmap developed by the Office of Information and Technology (OIT), the [Federal Health IT Strategic Plan](#) and the VA/Department of Defense (DoD) Joint Strategic Plan. The VHA HISP also supports the Planning, Programming, Budgeting and Execution (PPBE) and VHA IT Governance processes. Figure 1 depicts the relationship between the VHA HISP and other strategic planning elements. Additional information on the VHA IT Governance process and mappings of the VHA HISP to other strategic plans are available in the [VHA HISP Supplemental Information document](#).

The VHA HISP provides a characterization of the envisioned future state of the VHA HIT environment including near-term focus areas and long-term goals, derived from the overarching VA goals and objectives. There are numerous strategic drivers that evolve over time and impact VHA's HIT strategy and investments. The VHA HISP describes those drivers along with the four long-term HIT goals, and related objectives, that comprise the VHA HIT strategy.

Although VHA IT has matured in many areas, there are areas for improvement that will require a significant investment in both dollars and commitment to meet the future vision. The VHA HISP describes the future IT environment, including current IT initiatives and respective planning elements, to help VHA effectively align scarce resources with needs and support movement toward achieving the HIT goals.

VHA HISP oversight is the responsibility of the VHA GB ITC Health IT Strategy Sub-Committee (ITSSC). Health ITSSC membership represents a cross section of VHA field operations, program offices, and OIT.

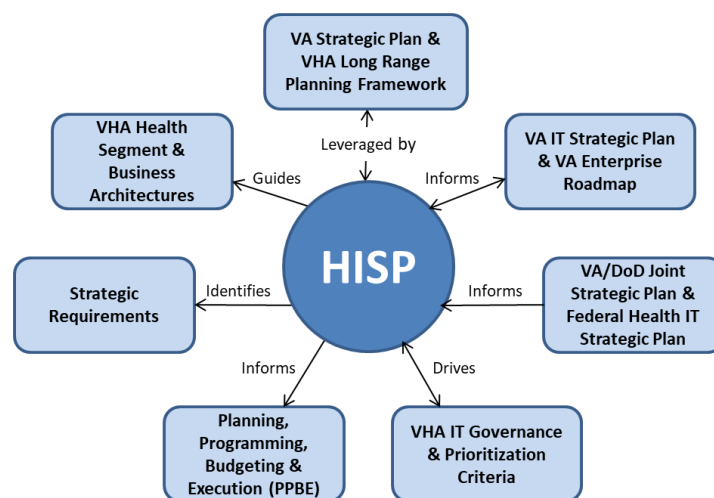


Figure 1 – VHA HISP Impact on Strategic Planning

1.2 VETERAN BENEFITS FROM VHA'S HEALTH INFORMATION TECHNOLOGY

The three vignettes below are examples of how HIT helps our Nation's Veterans. The VHA HISP defines VHA's goals for the enhancement and use of HIT.

When Tom first got out of the U.S. Army, he wasn't sure how much of his medical history he would have to write down for the VHA. When he arrived for his first visit to VHA, Tom discovered that, not only did VHA have his complete medical record from his time in the service, but the doctor immediately had a refill for a prescription he had been taking. The doctor also saw a trend suggesting Tom might be on a path toward developing diabetes. Since Tom lives in an area where there isn't a local VA outpatient clinic, VHA sent Tom to a local physician for treatment (community care provider). The physician made notes in the electronic health record (EHR) system and Tom has periodic follow-ups with VHA providers. VHA providers have all those notes thanks to the Nationwide Health Information Network efforts. This integrated medical record from the DoD to VHA and community providers allows Tom and his doctors to manage his health and lower his long-term health risks.



When Mary retired after 22 years in the service, she and her family re-located to a rural area located 200 miles from the nearest VA Medical Center (VAMC). Mary was faced with treacherous weather and dangerous driving conditions to see her provider in the Women's Comprehensive Primary Care Clinic. As a result, she doubted that she would be able to seek care through VHA. After contacting her assigned Women Veterans Program Manager, Mary discovered that her provider would be able to "see" her at a VHA partner telehealth access station located only 20 minutes from her house at the local Walmart.

Mary had some doubts about using telehealth to "see" a provider; however, she decided to go for at least one appointment. After arriving at the telehealth access station, Mary was screened by her assigned station volunteer who walked her through what she could expect from the appointment. She then met with her provider via Total Exam equipment for her comprehensive physical. Mary was amazed that she was able to discuss her medical conditions with her provider as if they were in the same room together. The entire experience provided Mary with a great sense of relief knowing that she could receive comprehensive care without traveling extremely long distances. Mary now meets with her provider every few months through telehealth and is thrilled with the outstanding care she receives using modern technologies.

John suffered traumatic brain injury while serving in Operation Enduring Freedom. After receiving initial rehabilitation, he was allowed to return home outside of Lewiston, MT with his wife, Sally. Rather than constantly driving to the Fort Harrison (MT) VAMC for long-term rehabilitation, they use a tablet to identify available VA providers, initiate virtual care visits, and communicate with the patient care team. The built-in camera allows for face-to-face discussions with his therapists. The team sends visual and fine motor skill practice to the tablet and can monitor John's long-term progress. Also, with a VHA outpatient clinic in Lewiston, seeing a physician in person is far more convenient, and the clinic has all the telemedicine facilities necessary to work with the Fort Harrison VAMC specialists. Sally wouldn't be able to help John in his recovery without these tools. By being home, and Sally feeling empowered and capable, their marriage is more stable, and John doesn't suffer increased stress over the possibility of losing his wife.



2 VHA STRATEGIC DRIVERS FOR THE FUTURE OF VHA HEALTHCARE

VHA conducts continuous environmental scans of the health information environment to identify strategic drivers that may influence VHA HIT strategy and help prioritize VHA IT investments. The environmental scans look for changes relative to the following categories:

1. **Technology Trends** – Expected HIT advancements with a potential to disrupt VHA business practices and processes and contribute to healthcare transformation through incorporation of emerging health best practices, security, and privacy enhancements, sharing clinical knowledge and workflows, and accommodation of clinical decision support (CDS) at the point of care.
2. **Healthcare Industry Business Trends** – The healthcare industry faces significant changes in the foreseeable future. VHA must adapt based on these changes to be able to function effectively as a key player in the healthcare industry.
3. **Veteran Demographics and Needs** – Demographic trends play an important role in the evolution of HIT in VHA. Predictive analyses of demographics, social factors, and specific healthcare requirements help identify evolving trends in VHA demographics. This allows VHA to anticipate the volume of care needed in certain specialties.
4. **Laws, Regulations and Policies/Standards** – As a government department, key legislative changes are expected to impact VA and the services it provides, including healthcare and related IT solutions.
5. **VHA Performance Gaps/Improvement Opportunities** – Areas where it is critical for VHA to improve its clinical or business performance, as identified through assessment of performance measures, product effectiveness analyses, external and internal inspection, Lean-based continuous improvement projects, and innovation efforts.

Figure 2 depicts the current VHA strategic drivers for each category. Additional details, including a description of the strategic driver and its possible impacts to VHA, are available in Appendix A.

1. Technology Trends

- Interoperability between healthcare entities
- Big Data & predictive analytics
- Artificial intelligence & machine learning
- Quantum computing
- Virtual & augmented reality
- Mobile devices & wearable sensors
- Advanced technology in EHR market
- Cloud computing
- Internet of things
- M2M communications
- Data segmentation & security labeling
- Access control
- 3D & 4D printing
- Online portals
- Blockchain for healthcare

2. Healthcare Industry Business Trends

- Convenient access
- Care coordination
- Evidence-based medicine
- Value-based medicine
- Cost pressures & budget constraints
- Telehealth/virtual care services
- Precision medicine & genomics research
- Health equity
- Population health
- Recruitment & retention of providers



3. Veteran Demographics & Needs

- Veterans in rural areas
- Evolving age groups
- Increase in disabilities
- Increase in female Veterans

4. Laws, Regulations & Policies/Standards

- VA MISSION Act
- ONC security standards
- NDAA for FY2020
- Foundations for Evidence-Based Policymaking Act
- OPEN Government Data Act
- Confidential Info Protection & Statistical Efficiency Act
- 21st Century Cures Act

5. VHA Performance Gaps/Improvement Opportunities

- SMART performance measures
- Data weaknesses
- Integrated planning
- Data tracking for clinical trainees
- Health research
- Business enabling services

Figure 2 – VHA Strategic Drivers Influence the VHA HIT Strategy

3 VHA HIT GOALS AND OBJECTIVES

The future VHA HIT environment will have the following characteristics:

- Advanced EHR capabilities (e.g., EHR Modernization (EHRM)/Cerner solution)
- Clinical decision support (CDS) that leverages Big Data, including Veteran genomic data and patient generated data from wearable devices and sensors
- Enterprise-wide data and information standardization
- Interoperability between VHA, DoD, and community providers
- Secure information exchange
- Efficient and cost-effective care delivery leveraging an array of innovative technologies to provide convenient access to care, including telehealth (i.e., virtual care) and mobile health services
- Operate as a High Reliability Organization (HRO), including the creation of a learning organization
- Value based and outcome driven
- Agile and able to meet the healthcare needs of a diverse Veteran population

This will facilitate lowering the overall cost of healthcare delivery, along with positive improvements in health outcomes and Veteran and provider experiences with VHA, as it redefines the boundaries of where, how, and when care is provided. Additionally, these enhancements will assist with attracting and retaining employees and encourage Veterans to make VHA their healthcare provider of choice, in line with the ChooseVA campaign.

Based on the mission, vision, and strategies of both VA and VHA, VHA developed four long-term goals to provide a roadmap to attaining the future HIT environment. In FY2021, the Health ITSSC collaborated with relevant stakeholders to refresh the VHA HIT Goals and ensure they reflect the revised VHA Long Range Plan goals developed by the VHA Chief Strategy Office in FY2020. The VHA HIT Goals directly align to the overarching VHA goals, as depicted in Figure 3.

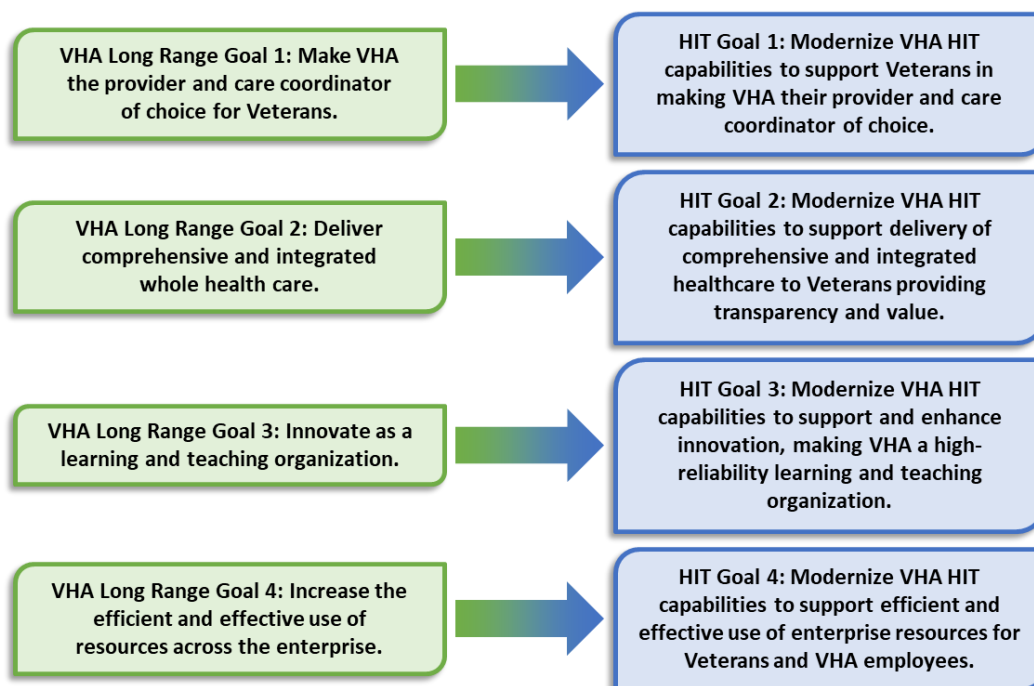


Figure 3 – Direct Relationship Between VHA and HIT Goals

The HIT Goals are also reflective of the three priorities communicated by VHA leadership. A mapping showing the alignment of the HIT Goals to the VHA priorities is included in the [VHA HISP Supplemental Information document](#). The priorities are:

1. Restoring trust in VHA by ensuring that when Veterans come to see us, we are delivering top-quality service and highly reliable care that improves Veterans' health and prevents harm.
2. Creating a learning organization in which science and informatics, Veteran-clinician partnerships, incentives, and culture are aligned to promote and enable continuous and real-time improvement in both the effectiveness and efficiency of care.
3. Modernizing VHA's structure, culture, governance, and systems.¹

The HIT Goals, and their related objectives, are described in the following sub-sections. The descriptions expound on current and/or planned VHA initiatives to attain the HIT Goals, as well as provide a glimpse of the desired future state for VHA HIT relative to each goal. Performance measures were also identified to track progress towards achieving the HIT Goals and Objectives.

3.1 HIT GOAL 1

Goal 1	Modernize VHA HIT capabilities to support Veterans in making VHA their provider and care coordinator of choice.
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HIT Goal 1 focuses on optimizing access to healthcare services and information and providing Veterans with informed choices of where, how, when, and from whom they receive care. For VHA, this will involve expanding VHA's care network to allow Veterans to receive care from a greater range of community providers, as well as providing alternate forms of access through telehealth (i.e., virtual care) and mobile care programs. Adoption of innovative healthcare technologies, such as mobile applications, wearable sensors, secure messaging, and online patient portals, will provide measurable benefits to Veterans and VHA personnel by providing timely and convenient access to health information and services, which will in turn improve quality, safety, and health outcomes.

Performance Measures

Increase in the percentage of the Veteran population utilizing telehealth services and mobile health applications.

3.1.1 Objective 1.1: Improve Veterans' access to healthcare services by expanding telehealth to alternative healthcare settings such as home-based and mobile or telehealth clinics at partner locations (e.g., community providers, commercial partners/Walmart, and Veteran Service Organizations).

VHA has and will continue to implement innovative IT practices to improve Veterans' access to healthcare, such as telehealth and mobile clinics, to provide care to all Veterans when and where they need it. Telehealth utilizes information and telecommunication technologies to provide healthcare services when the patient and practitioner are separated by geographical distance. In FY2020, VHA provided more than 5.6 million episodes of telehealth care across three modalities (home telehealth, clinical video telehealth, and store-and-forward telehealth) to over 1.6 million Veterans.² Many of these Veterans lived in rural areas and may otherwise have had limited access to VHA healthcare. **Error! Reference source not found.** shows where various telehealth services are provided.

¹ VHA Plan for Modernization, March 21, 2019, pg. 2.

² VHA Office of Connected Care, VHA Connected Care Strategic Plan 2021-2025, pg. 2.



Figure 4 – Where VA Telehealth Occurs³

The use of telehealth and related technologies, including video conferencing at clinics or partner retail pharmacies (e.g., CVS and Walmart), store-and-forward imaging, and home telehealth devices (e.g., remote monitoring), aims to improve the health of Veterans by expanding clinical care beyond the traditional office visit, provides cutting-edge specialty care in sparsely populated areas, and improves coordination between Veterans and their care teams. This supports the concept of health equity by ensuring all Veterans have the opportunity to receive the same high-quality VHA healthcare no matter where they reside. Telehealth can also be used to provide care during national emergencies (e.g., natural disaster, pandemic, etc.). VHA is dedicated to providing the most up-to-date technologies to enhance patient experiences and will continue to optimize access to care via IT advancements in telehealth, mobile, or online healthcare services.

3.1.2 Objective 1.2: Leverage innovative solutions, including mobile applications, personal devices, and wearable sensors, to gather patient generated health data and provide secure, timely exchange of that data between Veterans and providers to inform care decisions.

In order to provide the best care to Veterans, VHA must leverage technologies that allow Veterans to actively engage in their healthcare and assist with exchanging reliable, up to date health information. This may include VA-developed mobile applications for smart phones or tablets and wearable sensors or healthcare monitoring devices (e.g., remote glucose or heart monitors) provided by VHA, as well as commercially developed mobile applications or devices (e.g., Fitbit and Apple Health). The goal is to seamlessly integrate with VHA systems to import patient-generated health data from any device into the electronic health record in a format that allows that data to support clinical care through monitoring and tracking, as well as to inform analysis and care decisions. Eventually, VHA providers will be able to prescribe these connected technologies to Veterans as part of their care plans.

These applications and devices will assist Veterans by providing self-care services to meet their personal health goals and the information gathered can be leveraged by their care team when developing care plans. For example, VHA will develop mobile applications that provide health care education and coaching specific to a Veteran's healthcare needs or an automated text messaging program that can be tailored to interactively offer Veteran-specific recommendations. Through these options, Veterans will be able to manage their own health records, health data, and health recommendations within the context of their daily lives.⁴ Additionally, integration of patient generated health data into the electronic health record means VHA providers will be able to monitor specific metrics between visits and have accurate, real world data they can use to monitor effectiveness of treatments or inform diagnosis and/or care decisions to ultimately improve health outcomes.

³ Evans, Dr. Neil, VHA Office of Connected Care, Telehealth Strategic Vision briefing to ITSSC, August 24, 2021.

⁴ VHA Office of Connected Care, VHA Connected Care Strategic Plan 2021-2025, pg. 2.

3.1.3 Objective 1.3: Enhance patient portal capabilities to provide secure messaging, online scheduling, and availability of patient health records and care/medication instructions, to improve access to information and coordination between Veterans and their care teams.

VHA will continue to enhance online patient portal capabilities to provide an easy-to-use platform where Veterans can access their health information. Veterans will be able to view their health record, research preventive health recommendations, schedule appointments, request prescription refills, and securely message their providers. My HealtheVet is VA's current online Personal Health Record for Veterans, active duty service members, their dependents, and caregivers, which provides some of these services. The goal is to build and expand on these capabilities to provide a cohesive experience that provides enriched resources and tools that Veterans can utilize at any time to be more informed and better engage in their care and wellness. For example, Veterans will be able to locate on-demand services like tele-urgent care and join telehealth appointments directly from the platform. Additionally, Veterans will be able to initiate communication with their care team 24/7 through secure messaging, text chat, or video session.

Through a single, easily accessible platform, Veterans will be able to navigate to the services and information they need and to enhance the personalization, engagement, convenience, and experience of accessing VHA healthcare services. A robust online patient portal enhances engagement and communication between Veterans and their providers, streamlines administrative tasks like registration and scheduling, provides greater focus on Veteran care, and improves clinical outcomes through encouraging Veteran compliance with clinical recommendations like referrals and prescriptions.

3.1.4 Objective 1.4: Integrate and harmonize VA's public-facing web technologies to act as a single "digital front door" for accessing all VA-related services and to inspire communication and a sense of community among VA, Veterans, and their dependents.

VA previously initiated an effort to launch a revamped VA.gov website to serve as a unified portal for Veterans to access the full suite of VA services from all the administrations, including healthcare, benefits, and cemetery services. The main site acted as a hub to connect Veterans to the services and information they were seeking, while providing a seamless experience that minimized multiple logins and data entry redundancy. The "digital front door" takes this initial concept to the next level by further integrating access to VA's services through implementation of a multi-channel engagement strategy.

The goal of the digital front door will be optimizing Veteran engagement at every major touchpoint in their journey by providing digital interactions leveraging technologies that Veterans have already adopted for everyday use. This means that Veterans will be able to interact with VA and its administrations using the communication channel that is convenient for them, whether it is a phone call, secure message, text chat, mobile application, website, or video session. From the VHA perspective, Veterans will have a single platform through which they can initiate communications to VA at any time; see their key health information; schedule or join their appointments; and securely message their providers.⁵ The focus will be on developing a common content management system and incorporating best practices to impose cross-agency governance of VA content and avoid duplication, conflict, and inconsistency to provide a common experience no matter what modality is utilized. This will make Veterans feel that VA is considerate of their time and preferences and is capable of meeting their needs, thus enhancing trust, and making VHA their provider of choice.

⁵ VHA Office of Connected Care, VHA Connected Care Strategic Plan 2021-2025, pg. 1.

3.2 HIT GOAL 2

Goal 2	Modernize VHA HIT capabilities to support delivery of comprehensive and integrated healthcare to Veterans providing transparency and value.
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HIT Goal 2 focuses on providing comprehensive and integrated healthcare to Veterans that considers all factors relating to a Veteran's well-being including healthcare, behavioral health, nutrition, environmental care, and spiritual care. This approach augments traditional clinical care by providing both complementary therapies (such as acupuncture, massage, and yoga) and self-care resources to help Veterans achieve complete, long-term wellness.⁶ VHA encourages and empowers Veterans to be active participants in their healthcare journey along with their families, caregivers, and other support systems to ensure integrated care and to improve health outcomes. VHA will achieve its mission of becoming the premier provider of choice for America's Veterans through the delivery of timely and equitable quality healthcare regardless of where a Veteran resides or how a Veteran chooses to receive care. Helping Veterans build digital skills and employing devices (e.g., tablets and smartphones) that can be used and accessed easily, ensures Veterans are more actively involved in their healthcare journey and leads to improved health outcomes. Additionally, VHA established Integrated Clinical Communities (ICC), which are designed to create an enterprise-wide clinical framework that helps the exchange of best practice knowledge internally within the VHA.

Performance Measures

Increase in the percentage of external providers with whom VHA can bi-directionally exchange health records/information.

3.2.1 Objective 2.1: Enable comprehensive, Veteran-centric healthcare through the implementation of VHA, DoD, and community provider integration and interoperability efforts (e.g., EHR interoperability, Veteran Health Information Exchange, and HL7 FHIR).

VA's transformation into a high-performing, integrated delivery network (HPIDN) that focuses on the healthcare journey of each Veteran and a Veteran's support system, will empower Veterans and establish partnerships to achieve their health and life goals. The HPIDN approach demonstrates VA's commitment to safety and Veteran experience as well as to lifetime coordination and integration of healthcare delivery to our nation's Veterans. VA and VHA have an extensive network of partners, allowing VA to expand care coverage to Veterans and innovate on virtual care delivery that helps to fast-track a shared journey to fully integrated and seamless access to care. Strategic partnerships increase access to care, broaden understanding of Veterans' experiences, and facilitate the sharing of appropriate clinical and operational information for delivery of consistent, high-quality care to Veterans.

Veteran care is increasingly delivered across a broad and dynamic continuum and the ability for VHA to consume and share health information and knowledge, coordinate care processes, and conduct clinical quality management across tiers and institutions of care (e.g., community providers, research partners, etc.) is essential to ensure Veterans receive high-quality, comprehensive, and integrated care. To facilitate data sharing, VHA is implementing enterprise-wide data standardization that aligns with required and emerging health industry standards and best practices for the ethical use and sharing of clinical knowledge, clinical workflows, and Veteran data in a timely manner. The HPIDN model is Veteran-centric, founded in VA's strategic priorities, incorporates industry best practices, and adopts new platforms and technologies to deliver the most effective healthcare for Veterans. The network maintains VA care at the forefront, with support from federal, academic, and community partners.

⁶ VHA Vision Plan, December 2020, pg. 4.

VHA will leverage open data, transport, and other standards endorsed by the Office of the National Coordinator for Health IT (ONC) and adhere to key open architecture tenets, such as open transport formats (e.g., Health Level Seven (HL7) messaging), open interface specifications, and design patterns to enable open and scalable solutions. Additionally, VHA will adopt Fast Healthcare Interoperability Resources (FHIR) standards, which describe data formats and elements and is an Application Programming Interface (API) for exchanging EHRs. Care coordination, CDS, quality measurement, research, public health, and operational planning could all benefit from the adoption of national clinical data standards.

3.2.2 Objective 2.2: Enhance coordination, transparency, and continuity of care through collaborative partnerships and support systems to achieve integrated healthcare.

Community care remains a key component of VHA's Veteran-centric healthcare delivery strategy. VHA has been delivering care through community providers for decades, but the programs have grown in number and complexity. The VA Maintaining Internal Systems and Strengthening Integrated Outside Networks (MISSION) Act consolidates VA's community care programs into a new program that is easier to navigate for Veterans, community providers, and VA employees. Veterans who access community care can expect a familiar process with several improvements through a new urgent care benefit, expanded eligibility criteria, and improved quality of care. Community providers can expect their interaction with VA will get easier with new IT systems, better communications, and more timely payments.⁷ Additional information on community care efforts is available in the [VHA HISP Supplemental Information document](#), and the latest updates related to the VA MISSION Act are available on the [VA MISSION Act SharePoint site](#). The market assessments required by the MISSION Act are designed to ensure that VA's infrastructure and resources are balanced to meet Veterans' needs and will help VA align supply and demand of care to improve the access, timeliness, and quality of healthcare. The MISSION Act also directs VA to review the access standards defining when a Veteran can elect to receive community care every three years to ensure VA continues to meet Veteran needs. Additionally, research and education (e.g., academic) partnerships strive to directly improve the care that providers give to Veterans. The ability to work with and share research data with partners provides significant opportunities to improve both Veteran and public health.

3.2.3 Objective 2.3: Leverage predictive analytics, genomic and precision medicine, bioinformatics, and artificial intelligence/machine learning to analyze and interpret patient-specific data to inform clinical care decisions, improve health outcomes, and support reporting.

VHA must also implement innovative Veteran-centric healthcare techniques, such as the use of predictive analytics and the implementation of genomics to support precision (or personalized) medicine, into its HIT capabilities to inform clinical decision-making and improve Veteran health outcomes. Healthcare analytics provide immense value, improve quality of care, and offer a better patient experience through more personalized health care. VHA will leverage data, health informatics, and evidence to understand and improve outcomes. Additionally, VHA will pursue advanced healthcare research and analysis capabilities, with capacity to channel research-driven innovation into clinical or operational practices (e.g., integrating CDS into clinical processes), and share research information with external partners and the public. Shifts in how information is accessed and used by providers and Veterans present VHA with the opportunity to find new ways to improve the experience of Veterans and their families, building transparency and value into the services offered by VHA.

⁷ "MISSION Act 101," *VAntage Point Blog*, February 11, 2019, <https://www.blogs.va.gov/VAntage/56414/mission-act-101-how-the-law-will-improve-vas-ability-to-deliver-health-care-to-veterans/>

3.3 HIT GOAL 3

Goal 3	Modernize VHA HIT capabilities to support and enhance innovation, making VHA a high-reliability learning and teaching organization.
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HIT Goal 3 focuses on VHA modernizing its HIT capabilities to transform VHA into a High Reliability Organization (HRO). HROs experience fewer than anticipated accidents or events of harm, despite operating in highly complex, high-risk environments.⁸ Figure 5 depicts the three pillars of HRO change, and HIT should be used to better enable these changes: leadership engagement and commitment, a culture of safety, and continuous process improvements.

Performance Measures
Decrease in the number of reported safety events causing harm.



Figure 5 – Three HRO Pillars of Change⁹

3.3.1 Objective 3.1: Implement performance measurement capabilities to monitor and drive a culture of quality and safety and provide an accessible mechanism for accurate reporting.

VHA's HIT should enable VHA and community providers to provide a single standard of care and a common Veteran experience. Providers should be held to the same high standards no matter where they are and are expected to conform to all VA enterprise policies and procedures, specifically those related to safety and quality of care. To support this, VHA must implement IT capabilities that monitor and measure defined performance measures, for both VHA and community providers. The ability to accurately report on these defined performance measures in a timely manner, will provide the basis to monitor adherence to VHA quality and safety standards and initiate corrective actions when needed. HIT should enable root cause analysis to be performed, risks to be anticipated, and focus to be placed on front line staff and their care processes which will lead to learning, inquiring, and improving clinical and business operations.

⁸ VHA High Reliability Organization (HRO) Reference Guide, March 2021, Page 2, <https://dvagov.sharepoint.com/sites/OHT-PMO/high-reliability/Documents/VHA%20HRO%20Reference%20Guide.pdf>

⁹ VHA High Reliability Organization (HRO) Reference Guide, March 2021, Page 6, <https://dvagov.sharepoint.com/sites/OHT-PMO/high-reliability/Documents/VHA%20HRO%20Reference%20Guide.pdf>

3.3.2 Objective 3.2: Enable Corporate and regional analytics that further our understanding of utilization, quality of care, and comparative effectiveness, and use that knowledge to support continuous healthcare improvement.

VHA will focus on the expansion of corporate and regional analytics to interpret data and report on a multitude of metrics including, but not limited to, utilization rates, quality of care, safety measures, response time, clinical outcomes, etc. Correlating this information from across the enterprise in a format that allows for comparison will allow VHA to identify areas of success and areas for further improvement. For example, VHA has established regional and enterprise data governance boards and leverages them to gather IT-related needs to support enterprise and field-level reporting and analytics. The goal is to generate knowledge and best practices related to reporting, analytics, and business intelligence, and disseminate that information to healthcare providers and public health entities to inform clinical decision-making.

3.3.3 Objective 3.3: Adhere to VHA's enterprise privacy, security, and identity management policies to mitigate the risk to data at rest or in transit to maintain trust with Veterans.

As VHA becomes more interoperable with internal and external organizations, and as Veterans are increasingly accessing and exchanging their health information through various modes of technology, this increases concerns and issues related to Veteran privacy and security of information. VHA needs to maintain trust with Veterans and employees by working to identify, document, and disseminate standardized and secure design interfaces and processes to access authoritative data.¹⁰ For example, VHA was bound by various laws and regulations that limit the type of sensitive clinical data (e.g., sickle cell, AIDS, etc.) that could be transferred to community providers. As a result, VHA had to attain consent from Veterans which was difficult and time consuming and led to a significant backlog in responding to health information requests. To make this process more efficient, the VA MISSION Act changes the consent process from "opt in" to "opt out" and VHA is investing in IT solutions to help automate the response process. This is an example of how HIT can support efforts that ultimately enhance VHA outcomes, services, and transparency, and provide value to Veterans.

3.3.4 Objective 3.4: Support information management and IT capability needs for healthcare research (e.g., registries, databases, and queries) to enhance both Veteran and public health.

VHA's continued transformation into a learning organization, or Learning Health System (LHS), to provide exceptional service to Veterans and an engaging environment for employees is a must. A LHS is a system in which science, informatics, incentives, and culture are aligned for innovation, with best practices seamlessly embedded in the care process, Veterans and families are active participants in all elements, and new knowledge is captured as an integral by-product of the care experience.¹¹ Information is central to the LHS concept. VHA's HIT should enable integration and extraction of data from researchers, practitioners, Artificial Intelligence (AI)/Machine Learning (ML) devices, registries, and information within databases so that results from scientific research and best practices can be put into practice, both organizationally and clinically to enhance Veteran and public health.

¹⁰ Department of Veterans Affairs Office of Information and Technology Information Resource Management FY2020-2022 IT (IRM) Strategic Plan, Page 14.

¹¹ Friedman CP, Rubin JC, Sullivan KJ. Toward an Information Infrastructure for Global Health Improvement. IMIA Yearbook.

3.4 HIT GOAL 4

Goal 4	Modernize VHA HIT capabilities to support efficient and effective use of enterprise resources for Veterans and VHA employees.
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HIT Goal 4 focuses on delivering transformation initiatives that enable VHA to realize efficiencies in clinical and business workflows; assessing and prioritizing capabilities to allow VHA to provide the highest quality of healthcare services where VHA is a recognized leader; and improving the Veteran's digital experience through innovative approaches (e.g., clinical mobile applications, VA-issued or Veteran-owned devices for telehealth, Veteran portal via VA.gov) while protecting private health information to offer a wide array of connected services.

Performance Measures

Reduced cycle time to record information in an advanced EHR during care delivery and improved operational metrics on workflow stabilization.

3.4.1 Objective 4.1: Optimize health information technology value to Veterans and VHA employees by enabling seamless systems modernization (e.g., EHRM, FMBT, Supply Chain, and Contact Center) that meet workflow and usability needs.

The EHRM effort to modernize the outdated EHR portion of Veterans Health Information Systems and Technology Architecture (VistA) to Cerner Millennium will continue to move forward to transition to an advanced, commercial-off-the-shelf (COTS) EHR solution. Until the VistA EHR system is fully phased out, VA will need to maintain two EHR systems simultaneously, as well as support IT capabilities such as the Computerized Patient Record System (CPRS). The Cerner EHR solution implementation will continue to impact the VHA organization from medical center sites all the way up to Central Office and will be a catalyst for fundamental change in the way VHA delivers Veteran-focused, provider friendly care.¹²

Operational change management and continuity of operations during change impacts will be informed by leadership from the VHA Office of the Functional Champion who serves as the voice of the clinical and business end user and provides a decision-making model to identify and mitigate negative impacts from system transformation changes encountered during the EHR implementation.¹³ All VISN, VAMC, and Consolidated Patient Account Center leaders will also in turn supply appropriate subject matter expertise to support the Functional Champion team.¹⁴ Additionally, program-level governance forums between VA, DoD, and partner organizations should improve data interoperability, facilitate data-driven decisions among key stakeholders, and support a joint decision-making model to manage EHRM goals and objectives.

Concurrently, the VA is undertaking additional priority IT initiatives that will also significantly impact VHA operations and provide more efficient and interoperable systems: Financial Management Business Transformation (FMBT) and supply chain transformation. FMBT will replace the current financial management system with Integrated Financial Acquisition Management System (iFAMS), a COTS product, which will increase transparency, accuracy, timeliness, and reliability of financial information across VA. For supply chain transformation, the Veterans Affairs Logistics Redesign (VALOR) Program Office will partner with the DoD to implement DoD's Defense Medical Logistics Standard Support (DMLSS), and its

¹² U.S. Department of Veterans Affairs, Office of Information and Technology. (January 2, 2020). FY 2018-2024 U.S. Department of Veterans Affairs Enterprise Roadmap Executive Summary [Internal document]

¹³ U.S. Department of Veterans Affairs, Veterans Health Administration. (April 23, 2021). Functional Champion and EHR Implementation Focus Areas – Final Report [Internal document]

¹⁴ Ibid.

Cloud-based successor LogiCole, to modernize the logistics system to enable streamlined processes and business efficiencies, regulatory compliance, and collaboration.

The Enterprise Contact Center Modernization will deliver an easy and more effective customer experience as Veterans interact with VA through all communication channels (e.g., voice, chat, text, video).¹⁵ Enterprise Contact Center Modernization involves consolidating the existing network of contact centers and implementing emerging technologies and common user interfaces.¹⁶ State-of-the-art IT capabilities such as these will help VHA attract and retain high-quality healthcare providers and compete with alternate healthcare systems at the local level to attract Veterans and improve the overarching reputation of VHA as a high-quality healthcare provider.

3.4.2 Objective 4.2: Support delivery of Veteran-centered care in VA facilities and among community partners by effectively managing resources through continuous improvements in health IT governance decision support and data management standards and processes.

As VHA HIT looks across all points of care including hospitals, clinics, and home and community-based care settings, a must-have for healthcare analytics is an interoperable framework for VHA healthcare systems and community partners. The robust HIT infrastructure today is made possible by a project-centric IT service delivery model covering multiple business portfolios delivering care and other services to Veterans.¹⁷ Future HIT investment strategy decisions will require continuous alignment on VHA IT policies and processes to manage new requirements, solution analysis and design, execution, and the capability to measure critical metrics against directives. VHA HIT includes systems, applications, and capabilities that enable the interoperability of Veteran data between non-VA providers and VA, as well as between VistA and the Cerner EHR to ensure Veterans' EHRs remain current across providers.¹⁸ Additionally, continuous analysis and business intelligence on comprehensive data sets is being conducted in the areas of medical research, education, and population health to improve healthcare for all Veterans.¹⁹

Electronic health information management presents interoperability challenges for both technologists and informatics specialists to ensure that VHA remains an effective steward of Veteran data. Managing large amounts of data of different data types, with different sets of provenances and different data ownership/stewardship requirements, serves as an additional driver for medical research, education, and population health modernization.²⁰ As VHA continues to implement the MISSION Act and transitions from VistA to the Cerner EHR over the next 10 years, it will be increasingly important to ensure that each Veteran's EHR is up to date, complete, and not fragmented while multiple EHR systems are in operation at the same time.²¹ To manage the change impacts, the VA and DoD will apply a joint data ethics framework to leverage common strengths, identify an approach to manage unique data variation requirements, and integrate the data ethics framework into data steward processes.²²

¹⁵ U.S. Department of Veterans Affairs, Office of Information and Technology. (March 31, 2020). Digital Transformation – FY2020 – 2026 VA Enterprise Roadmap [Internal document]

¹⁶ Ibid.

¹⁷ U.S. Department of Veterans Affairs, Office of Information and Technology. (January 2, 2020). FY 2018-2024 U.S. Department of Veterans Affairs Enterprise Roadmap Executive Summary [Internal document]

¹⁸ Ibid.

¹⁹ U.S. Department of Veterans Affairs, Office of Information and Technology. (March 31, 2020). Digital Transformation – FY2020 – 2026 VA Enterprise Roadmap [Internal document]

²⁰ Ibid.

²¹ Ibid.

²² U.S. Department of Veterans Affairs and Department of Defense, Joint Executive Committee. (July, 2021). VA-DoD Joint Data and Analytics Strategy Plan of Action [Internal document]

3.4.3 Objective 4.3: Ensure that healthcare delivery to Veterans aligns with industry standards for digital connectivity and actively participate in the development of those standards.

Evolving healthcare technology delivery via the cloud as VHA moves forward will require greater demand for a uniform technology platform to minimize risks of exposure, and application credentialing to manage endpoints that may or may not reside on the network. For example, IT upgrades and further expansion in cloud computing during the pandemic allowed VHA to accommodate a significant spike in demand for telehealth support. Initiatives that continue to move toward a fully deployed hybrid cloud environment with improved wireless and mobile connectivity will expand opportunities to scale VHA HIT architecture.²³ To better deliver Veterans choice in virtual care technologies and shape the development of future virtual care platforms, the VA Enterprise Cloud will represent a culmination of all mobile applications.²⁴ Utilizing the VA Robotic Process Automation (RPA) Platform, there are many opportunities for digital assistants to improve the level of service for Veterans performing tasks such as appointment scheduling, eligibility determination to access services from local health care providers, and specialist referrals which include a review of pre-care requirements.²⁵ AI-based RPA will become increasingly relevant to eliminating manual tasks in both the Veteran and customer service agent experience.²⁶ AI and ML approaches should be utilized to discover customer patterns, predict or anticipate customer needs, and augment customer, employee, and customer service agent tasks.²⁷

With the EHR implementation, collected patient data will automatically transfer to Veterans' EHRs and subsequently support clinicians to more effectively measure Veteran response to care and treatment effectiveness while achieving data standardization.²⁸ VA will also strive to empower Veterans with access to their own health record by implementing standards-based health data APIs that allow Veterans to access their joint VA/DoD record through a variety of approved third-party health applications.²⁹ Efforts to increase patient understanding of data usage will need to include awareness-building of potential secondary uses of data, how to control and safely access electronic health information, and how to make informed decisions concerning consent for data exchange.³⁰ To enable Veterans to be in control of their vital information, patient choice technologies should be employed for consent management to establish their participation in information exchanges and to dynamically maintain access and usage preferences.

As both legacy technologies and modernization initiatives are addressed across portfolios, the Federal Information Technology Acquisition Reform Act, the Data Center Optimization Initiative, and federal Cloud policies will guide standardization efforts.³¹ A multitude of technology advancements such as open APIs, SMART on FHIR applications, health information exchanges, partnering with digital and retail

²³ U.S. Department of Veterans Affairs, Office of Information and Technology. (January 2, 2020). FY 2018-2024 U.S. Department of Veterans Affairs Enterprise Roadmap Executive Summary [Internal document]

²⁴ U.S. Department of Veterans Affairs, Office of Information and Technology. (March 31, 2020). Digital Transformation – FY2020 – 2026 VA Enterprise Roadmap [Internal document]

²⁵ U.S. Department of Veterans Affairs, Office of Information and Technology. (August 13, 2021). What is Robotic Process Automation? DigitalVA. Retrieved August 25, 2021, from <https://www.oit.va.gov/services/rpa/>

²⁶ U.S. Department of Veterans Affairs, Office of Information and Technology. (March 31, 2020). Digital Transformation – FY2020 – 2026 VA Enterprise Roadmap [Internal document]

²⁷ Ibid.

²⁸ Ibid.

²⁹ U.S. Department of Veterans Affairs, Office of Electronic Health Record Modernization. (July, 2021) Electronic Health Record Modernization – Comprehensive Lessons Learned Report [Internal document]

³⁰ Office of the National Coordinator for Health Information Technology, Office of the Secretary, United States Department of Health and Human Services. (October, 2020). 2020-2025 Federal Health IT Strategic Plan, from HealthIT.gov.

³¹ U.S. Department of Veterans Affairs, Office of Information and Technology. (January 2, 2020). FY 2018-2024 U.S. Department of Veterans Affairs Enterprise Roadmap Executive Summary [Internal document]

disruptors in non-VA service delivery (e.g., Apple, Amazon, Walmart, CVS), genomics, healthcare blockchain, big data analytics and others will continue to shape the evolution of platforms and their required protections.³² Ensuring efficient and secure information exchange that adheres to standards (e.g., HL7 FHIR, Systematized Nomenclature of Medicine [SNOMED], Clinical Quality Measures, International Statistical Classification of Diseases and Related Health Problems 10th Revision [ICD-10], and National Information Exchange Model) and privacy and cybersecurity protections for remote-access enablement will continue to be an important part of VHA's HIT environment. As such, VHA will continue to play an active role in the development of industry standards for privacy, security, and data standardization to facilitate the free flow of information between both internal and external partners, while maintaining and protecting private health information.

³² Ibid.

4 SUMMARY

The VHA aspires to deliver high-quality, safe, and competitive healthcare that consistently delivers optimal outcomes for Veterans, in an efficient and timely manner where the Veteran is at the center of their care. Maintaining an environment that systematically values the Veteran preferences and shared decision-making and delivers excellence requires effectively applying all the tools and technical capabilities available, enhancing clinical and business processes, and reimagining the Veteran-provider experience. This means continuously working to improve performance and optimizing the selection, use, implementation, and evaluation of HIT to help achieve greater efficiencies for providers and Veterans. Through collaboration with OIT to modernize HIT capacity, capabilities, and processes, VHA will help solidify Veterans' trust and confidence in VHA services and act as a trusted partner that ensures needs of an engaged customer base and clinician workforce with increasing expectations are met. The greater purpose of these HIT innovations is to bring Veterans and providers together and utilize gains in operational efficiencies to allow for more meaningful time spent together.

The VHA HIT Goals and Objectives described in Section 3 are intended to keep VHA on the cutting-edge of technology and achieve the desired VHA HIT environment future state to best support VHA operations and services and make VHA the provider of choice for Veterans. By aligning VHA IT programs and investments with long-term HIT goals and strategic priorities, VHA will be best positioned to achieve these goals while investing efficiently and effectively for the future. The sub-sections below depict how the future state of VHA HIT will positively impact both Veterans and VHA end users.

4.1 FUTURE VISION FROM THE VETERAN PERSPECTIVE

As we envision the HIT future state from the Veteran's perspective, we make the assumption that Veterans will expect the following from VHA: convenience, ease of use, flexibility, timely access, personalized care, and improved health outcomes. To meet these expectations, VHA will redefine "access" by embracing non-traditional healthcare settings, including telehealth and mobile clinics, and leveraging community providers, to expand Veterans' access to VHA healthcare services, especially in rural or underserved areas. A focus on moving away from inpatient care, except for cases of the severely ill, in favor of smaller inpatient facilities and more outpatient/ambulatory facilities and telehealth capabilities allows Veterans to see the doctors they need, in convenient locations, and within a reasonable timeframe. Additionally, Veterans will be empowered and have greater ownership of their health information through online patient portals, mobile applications, and mobile health devices to both receive and transmit health information. By enhancing VHA online patient portal capabilities and developing accompanying mobile applications, Veterans will be able to access their health record as well as patient education materials, communicate with their providers through secure messaging, schedule appointments, and refill prescriptions via a multitude of devices. The increase in access to both healthcare services and health information will improve engagement between Veterans and their providers and, in turn, allow for more informed decision-making and improved health outcomes. The future state of VHA HIT creates an environment where the Veteran is an active partner with his/her healthcare delivery team.

For example, an elderly Veteran suffering from diabetes has experienced nerve damage in his lower leg due to his chronic condition, which makes walking and driving difficult. For this Veteran, the flexibility to meet virtually with his endocrinologist using telehealth from the comfort of his own home is imperative. Prior to the appointment, the Veteran can easily access his medical records and read patient education materials related to his specific condition. Once the Veteran logs in to the telehealth appointment, his medical history, notes from previous appointments, and test results are readily available and viewable by the provider. Another example is a Veteran with a cardiac condition who is provided a mobile health

device that continuously monitors the Veteran and alerts him, his care team, or even an ambulance when he experiences medical complications that need immediate treatment. This technology is available to Veterans because VHA developed mobile applications and algorithms that proactively identify issues.

As VHA accelerates the adoption, functionality, and interconnectivity of communication technologies and leverages business intelligence systems, Veterans will experience greater control and more choices for how, when, where, and by whom their care is delivered. Engaging Veterans to have a greater role in their healthcare will lead to better health outcomes and an overall improvement in the Veteran's experience.

4.2 FUTURE VISION FROM THE PROVIDER PERSPECTIVE

The future state of VHA HIT from the VHA end user perspective is one in which VHA operations and clinical staff's overall experience is enhanced by providing innovative tools that allow them to focus on the Veteran and perform their work more effectively, more efficiently, and from any location. VHA will have implemented best of breed COTS IT solutions to provide state of the art functionality, which will allow VHA to attract and retain employees and foster Veterans' trust in VA to be their provider of choice. To provide seamless, coordinated care to Veterans no matter where they receive care, interoperability and health information exchange between systems and healthcare entities will be of great importance. The availability of up-to-date and accurate health information among all VHA and partner providers is critical to inform clinical decisions and improve quality of care. All major IT systems will be integrated to ensure all health information is captured in the patient health record and available to providers in real time.

Additionally, VHA will focus on comprehensive healthcare and improvement of Veteran health outcomes. VHA will foster a culture of quality and become a high-reliability organization by emphasizing standardization of processes and data and provide a single standard of care to all Veterans. By enforcing data standardization and security protocols, VHA will be able to leverage innovative health technologies such as AI and ML to support predictive analytics and diagnostics for CDS. This will be enhanced by incorporating patient generated health data from third party mobile health devices or wearable sensors and mobile applications to inform healthcare decisions. VHA will also invest in researching new technologies like virtual and augmented reality to identify uses to support healthcare, such as in simulations for provider education and training.

For example, a VHA provider will be able to use a computer or tablet to hold a secure, virtual appointment with a Veteran suffering from a chronic disease through telehealth services. Prior to initiating the appointment, the provider can access the Veteran's medical record and comprehensive medical history from VHA and DoD facilities and/or community providers on the same device. The record includes a listing of all current prescriptions, diagnostic data from a remote monitoring device, and a log of data provided by the Veteran. The connection between VHA's and community providers' EHRs will allow both parties to see what is documented by the other provider in real-time, thereby preventing duplication of testing and services the Veteran receives. Once connected, they will use Veteran-specific health data, including genomic and patient generated data (e.g., heart rate, glucose levels, etc.), coupled with CDS and AI systems, to inform clinical decision-making. The provider's notes, recommended treatment, diagnoses, and prescriptions will be updated in the medical record instantly and securely which will lessen the burden of record keeping and duplicative data entry. The CDS system would generate reminder notifications for follow-up appointments or referrals and send to the Veteran via text or email.

As VHA modernizes its HIT systems and infrastructure and adopts innovative technologies, VHA end users will realize the benefit of this transformation from an operational stance (e.g., comprehensive and integrated medical records in the Cerner EHR system) as well as interaction with Veterans (e.g., leveraging telehealth and remote monitoring).

APPENDIX A – VHA STRATEGIC DRIVER DESCRIPTIONS

Table 1 lists the current strategic drivers that influence the VHA HIT strategy. A short description of each driver and the possible impacts to VHA are included.

The strategic drivers are sorted into five categories: 1. Technology Trends, 2. Healthcare Industry Business Trends, 3. Veteran Demographics and Needs, 4. Laws, Regulations and Policies/Standards, and 5. VHA Performance Gaps/Improvement Opportunities. Drivers may be related to multiple categories, but only the main category is used in the table.

A mapping of the strategic drivers to the HIT Goals and additional information on select strategic drivers are included in the [VHA HISP Supplemental Information document](#).

Table 1 – List of VHA Strategic Drivers

Category / Driver	Description
1. Technology Trends	Expected HIT advancements with a potential to disrupt VHA business practices and processes and contribute to healthcare transformation through incorporation of emerging health best practices, security, and privacy enhancements, sharing clinical knowledge and workflows, and accommodation of CDS at the point of care.
<i>Interoperability between healthcare entities</i>	Interoperability among health information systems and devices refers to the ability to share, exchange, and effectively use electronic health information in a timely and meaningful manner. ³³ An accessible, interoperable EHR between VA, DoD, and community providers is a necessity. The ability to seamlessly share health information is imperative to providing comprehensive, high-quality healthcare. Trust frameworks define standards and policies to facilitate secure, interoperable digital ecosystems. VHA is transitioning to Cerner Millennium to provide a single patient record between VA and DoD and improve interoperability with community providers. VHA also needs to automate responses to data requests to improve efficiency, explore adoption of APIs for health data exchange (e.g., FHIR), and utilize established trust frameworks.
<i>Big Data and predictive analytics</i>	Big Data refers to extremely large data sets. Predictive analytics utilizes big data to identify trends and produce predictive models that can be used for precision medicine, learning health systems, and CDS. VHA has vast stores of patient data in the Corporate Data Warehouse that can be leveraged for clinical, research, public health, and administrative purposes and to develop innovations and improve patient outcomes.
<i>Artificial intelligence (AI) and machine learning (ML)</i>	AI applies advanced analysis and logic-based techniques, including ML, to interpret events, support and automate decisions, and take actions. ³⁴ ML, including the subset known as deep learning, in healthcare utilizes computer algorithms to analyze complex medical data to find patterns and reason about data to improve decision-making. VHA can implement AI and ML to support diagnostics, treatment protocol development, personalized medicine, patient monitoring and care, etc. When working with AI, VHA must consider ethical impacts. VA recently appointed a Director of AI to oversee current AI research initiatives for suicide prevention and cancer detection. ³⁵

³³ Hype Cycle for Healthcare Providers 2020, Gartner, August 5, 2020.

³⁴ <https://www.gartner.com/it-glossary/artificial-intelligence/>

³⁵ "VA Names Gil Alterovitz Department's First AI Director", *MeriTalk News Blog*, July 12, 2019, www.meritalk.com.

Category / Driver	Description
<i>Quantum computing</i>	Quantum computers leverage the principles of quantum mechanics to solve problems at incredible speeds that are impossible for traditional computers. Combined with Big Data and AI, VHA can leverage quantum computing to assist in many facets of healthcare including, but not limited to, drug discovery, genome sequencing, medical imaging, and precision medicine. The computational power of quantum computing can deliver real-time results and inform clinical decision-making.
<i>Virtual and augmented reality</i>	Virtual and augmented reality have significant implications for healthcare due to a wide array of applications, from direct patient care to surgery simulation and skills training. VHA should explore possible uses of virtual or augmented reality, specifically for mental health treatment and staff training. VHA is currently augmenting Post Traumatic Stress Disorder exposure therapy with virtual reality, through a partnership with a nonprofit organization that provides virtual reality hardware and software to select VHA facilities. ³⁶
<i>Mobile devices and wearable sensors for data collection</i>	Use of mobile devices and wearable sensors for medical data collection (including patient generated data), remote monitoring, and interaction with healthcare providers is rapidly increasing (“bring your own device”). VHA needs to explore secure, mobile, and wearable technologies that can improve monitoring capabilities, integrate collected personal health data, and interact with Veterans regarding health status and outcomes in real-time. VHA must also consider patient privacy ethics when collecting patient generated health data.
<i>Advanced technology in the EHR market</i>	The private sector and COTS EHR products have evolved and surpassed Vista/CPRS in functionality. VHA is transitioning to Cerner Millennium (a COTS EHR solution) to meet current expectations of Veterans and take advantage of advanced COTS functionality.
<i>Growth in cloud computing</i>	Acceptance of cloud computing and Software as a Service (SaaS) has led to increased growth. VHA can leverage these services to free up resources that can then be used for HIT-related efforts and investments. Cloud computing also provides infrastructure to support mobile applications.
<i>Internet of Things (IoT)</i>	The IoT in healthcare is a collection of devices, applications, equipment, appliances, and buildings that possess the intelligence and technology to connect, communicate and interoperate with each other using standards within the healthcare provider IT ecosystem of smart things. IoT in healthcare is foundational to the real-time health system. ³⁷ VHA capabilities like asset tracking and inventory control (e.g., real-time location services), and remote patient monitoring (e.g., medical devices, virtual care/telehealth) will benefit from IoT through real-time connectivity. It will positively impact healthcare providers’ ability to deliver care more efficiently and cost-effectively.
<i>Machine to Machine (M2M) communications</i>	M2M communication is the autonomous interaction of a large number of devices to perform sensing, processing, and actuation activities without human intervention (e.g., remote monitoring). The primary objective is to enable communication among smart devices. ³⁸ This technology is the backbone of IoT. VHA can use M2M communications in its expansion of the use of wearable sensors, mobile devices, and applications. For example, VHA personnel can establish a connection between a heartbeat sensor connected to a patient’s body and the server. The purpose is to reduce human intervention and achieve improved response time and accuracy.

³⁶ <https://www.soldierstrong.org/strongmind/>

³⁷ Hype Cycle for Healthcare Providers 2020, Gartner, August 5, 2020.

³⁸ 2019-2020 VHA Security and Privacy Trends Analysis Report, Security and Privacy Architecture, May 2020.

Category / Driver	Description
<i>Data segmentation and security labeling</i>	Data segmentation allows for parsing structured and unstructured data to search, identify, and segment patient's personal health information. Data can then be labeled for security or privacy purposes. ³⁹ These labels apply descriptive data about healthcare information so that appropriate access control and data handling decisions can be made. Security labeling is already an integral element in VHA's efforts to meet stringent privacy and security requirements. "Sharing with protections" strikes a balance between sharing and protecting personal healthcare information when sending information outside of VHA. VHA needs to explore HIT solutions that support internal security labeling and external information sharing with protections based on information classifications.
<i>Access control</i>	Attribute-based access control (ABAC) manages access rights for people and systems connecting to networks and assets, offering greater efficiency, flexibility, scalability, and security. ⁴⁰ The trend is towards using ABAC or ABAC hybrid access control models. VHA can leverage these technologies to improve identity and access management to help ensure consistency in authentication, authorization, administration, and auditing.
<i>3D and 4D printing</i>	Medical professionals are increasingly exploring 3D and 4D printing for prototyping and other use cases for better agility, cost savings, and innovation for future products. VHA has employed 3D printers to create one-of-a-kind devices tailored for patients as part of the assistive technology program and should continue to explore additional uses, as well as explore possible applications for 4D printing.
<i>Online portals for patients and providers</i>	Online portals enable a secure digital patient/provider communications channel that provides access to clinical, financial, and administrative functionality, educational information, and personal health maintenance tools. Additionally, portals that are not tethered to an EHR provide added value in that patients can see data aggregated across multiple providers. ⁴¹ As VHA expands the use of community providers and transitions to a new EHR system, it will require a structured mechanism for coordinating care across multiple systems and providers. Online portals provide a centralized tool for patients and providers to manage and/or access healthcare information. Portals allow for accessing medical records, maintaining patient generated data, utilizing secure messaging, and scheduling capabilities, and managing consent authorizations for who can access healthcare data.
<i>Blockchain for healthcare</i>	A blockchain is an expanding list of cryptographically signed, irrevocable transactional records shared by all participants in a network (e.g., patients, providers, payers). Each block of records is time-stamped and references links to previous data blocks. Anyone with access rights can trace a state change historically in data or an event belonging to any participant. ⁴² VHA should research opportunities for leveraging emerging blockchain applications to support VHA healthcare delivery and operations. Blockchain technology can be used to support secure transfer of patient medical records, manage the supply chain, or allow patients to assign access rules for their medical data. Additionally, blockchain allows patients to connect to other hospitals and collect their medical data automatically. ⁴³
2. Healthcare Industry Business Trends	The healthcare industry faces significant changes in the foreseeable future. VHA must adapt based on these changes to be able to function effectively as a key player in the healthcare industry.

³⁹ 2019-2020 VHA Security and Privacy Trends Analysis Report, Security and Privacy Architecture, May 2020.

⁴⁰ VHA OHI Health Information Governance, Security and Privacy Architecture Megatrends, 2017, pg. 30.

⁴¹ Hype Cycle for Healthcare Providers 2020, Gartner, August 5, 2020.

⁴² Hype Cycle for Healthcare Providers 2020, Gartner, August 5, 2020.

⁴³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6517629/>

Category / Driver	Description
<i>Convenient access</i>	<p>Increased expectations of convenient access to both clinical care and health information for all Veterans when and where they want it, including immediate on-demand care. Consumers have new mindsets around engagement in and ownership of their care and health information.</p> <p>VHA needs to increase its capacity to provide services outside of the traditional facility model, as well as provide mechanisms for providers and Veterans to access health information. To do this, VHA needs to explore exponential technologies which drive less expensive, more efficient, and more accessible delivery of services and information.</p>
<i>Care coordination</i>	<p>Coordinate care through seamless exchange of health information, clinical knowledge, care workflows, and quality management across institutions of care to improve the patient and provider experience.</p> <p>VHA needs to optimize care coordination through enhancement of health information sharing capabilities, including EHR, mobile devices, and patient and provider portals, as well as through expansion of telehealth and community care services.</p>
<i>Evidence-based medicine</i>	<p>Evidence-based medicine involves systematically reviewing clinical data and making treatment decisions based on the best available information, to improve quality and outcomes.</p> <p>VHA needs to build measurability into its systems and facilitate the use of medical knowledge and business intelligence to leverage data about quality, cost, access, and satisfaction to optimize clinical and business processes in real-time. Quality standards must be set and measured, for both VHA and community care providers, and VHA needs to increase the use of CDS and analytics tools to support decisions at the point-of-care.</p>
<i>Value-based healthcare</i>	<p>Quality and outcome focused care has become the national expectation. The principle of value-based healthcare is that value (i.e., improved patient health outcomes, quality, and processes) is created by caring for a patient's medical condition over the full cycle of care and focusing on whole health over the lifetime of the patient.</p> <p>To implement, VHA would need to reorganize care around patient conditions through integrated practice units, measure outcomes and costs for every patient, integrate multi-site care delivery systems, implement continuous process improvement strategies, expand geographic reach to drive excellence, and build an enabling IT platform.⁴⁴</p>
<i>Cost pressures and budget constraints</i>	<p>Healthcare is a national economic issue. VHA faces intense pressure to expand services and improve care quality while functioning in a tighter budget environment.</p> <p>VHA needs to invest in HIT that has a clear return on investment, allocate overall resources efficiently, and determine how best to leverage and sustain technologies as IT funding decreases. By attaining efficiencies through HIT, moving away from traditional brick and mortar facilities, and sunsetting obsolete IT systems, VHA should be able to reallocate funding from these areas to be used elsewhere.</p>
<i>Telehealth/virtual care services</i>	<p>The demand for telehealth and virtual care is increasing to improve access to healthcare services not readily available and is emerging as a tool for disease management. Additionally, these services can assist in providing care during national emergencies (e.g., natural disaster, pandemic, etc.).</p> <p>VHA needs to explore additional ways to leverage telehealth and virtual care services as more tech savvy Veterans demand a more inclusive healthcare experience and desire more convenient access to healthcare services, including immediate on-demand care.</p>

⁴⁴ Porter, Professor Michael E., Harvard Business School, Health Care Delivery Intensive Seminar, January 4, 2016.

Category / Driver	Description
<i>Precision medicine and genomics research</i>	Precision medicine is the tailoring of medical treatment to the individual characteristics of each patient. It involves integrating data from EHRs, population health, disease genomics, labs, images, treatment protocols and other digital data sources to inform clinical diagnosis and treatment protocol development. ⁴⁵ Genomics research is an integral ingredient to precision medicine. This type of data may have huge implications for future treatment and diagnosis of diseases like cancer, hypertension, and diabetes. Precision medicine relies on effective, efficient, and actionable patient data collection and the analysis and assessment of that data to arrive at a precise diagnosis and treatment. VHA is actively collecting DNA from Veterans as part of the Million Veteran Program and should invest in IT systems to support the use of genomics and other data to best leverage precision medicine capabilities to improve Veteran care. VHA must also consider patient privacy ethics when leveraging genomic data.
<i>Health equity</i>	There is an increasing focus on healthcare paradigms that ensure healthcare is delivered equitably and that entire populations can be addressed in decision-making. VHA needs to incorporate core principles of population health and health equity.
<i>Population health</i>	Population health is an approach to health that aims to improve the health of an entire human population and focuses on prevention. VHA must invest in HIT solutions that allow for sharing health data and collaborating with research entities to support population health and clinical research. Technologies related to predictive analytics and genomics have applications for population health.
<i>Recruitment and retention of quality healthcare providers</i>	Across the industry, there is a shortage of providers and thus an increase in competition for healthcare providers. VHA needs to develop plans for attraction and retention of high-quality healthcare providers, including providing state-of-the art equipment, tools, and facilities.
3. Veteran Demographics and Needs	Demographic trends play an important role in the evolution of HIT in VHA. Predictive analyses of demographics, social factors, and specific healthcare requirements, such as the Veteran Population Model and Enrollee Health Care Projection Model, help identify evolving trends in VHA demographics. This allows VHA to anticipate the volume of care needed in certain specialties.
<i>Large number of Veterans in rural areas</i>	VHA has 2.7 million enrolled Veterans living in rural and highly rural areas, which is about 30% of the enrolled Veteran population. ⁴⁶ VHA needs to increase its capability to provide remote or non-traditional facility treatments to reach this population. This can be achieved through investments in telehealth, mobile clinics, and other mobile technologies as well as partnering with community providers.
<i>Evolving age groups within the Veteran population</i>	The number of Veterans aged 65-84 and 85+ is expected to increase; with the 65-84 age group remaining the largest percentage of the total population. ⁴⁷ The number of Veterans aged under 45 is also expected to increase and these younger Veterans are more technology savvy and have different expectations for their healthcare experience. As the older Veteran population continues to age, there will be an increase in the need for services related to primary care, geriatrics, and ambulatory care. In contrast, growth in the younger age bracket may drive the use of emerging technologies such as telehealth, mobile devices, social media, and enhanced information sharing capabilities.

⁴⁵ Hype Cycle for Healthcare Providers 2020, Gartner, August 5, 2020.

⁴⁶ <https://www.ruralhealth.va.gov/aboutus/ruralvets.asp>

⁴⁷ Base Year 2017 VA Enrollee Health Care Projection Model, Office of the ADUSH for Policy and Planning, November 2018.

Category / Driver	Description
<i>Increase in number of Veterans with disabilities</i>	Enrollment trends show an increase in the number of enrollees being adjudicated for service-connected disabilities, increasing the number of enrollees in Priorities 1, 2, and 3. This will impact future demand for VHA healthcare services, such as: home and community-based services, short stay and long-term services and support, mental health services, surgery, and prosthetics. Increased use of these services will likely increase the need for telehealth, mobile applications, remote sensors and monitoring, and the availability of patient data across multiple locations.
<i>Increase in number of female Veterans</i>	Women are the fastest growing cohort within the Veteran community with an expected increase from 8.2% of the enrolled Veteran population in 2017 to 13.9% by 2037. ⁴⁸ The expected rise in female Veterans means that the VHA will need to improve access to women's health services.
4. Laws, Regulations and Policies/Standards	As a government department, key legislative changes are expected to impact VA and the services it provides, including healthcare and related IT solutions.
<i>Office of the National Coordinator for Health IT (ONC) security standards</i>	ONC is driving the Standards and Interoperability Framework to implement core technical standards. VHA needs to increase focus on privacy and security to detect and prevent medical identity theft. VHA also needs to stay informed and adopt core standards (e.g., ICD-10, HL7, and FHIR) to support healthcare information sharing.
<i>National Defense Authorization Act (NDAA) for Fiscal Year 2020</i>	The NDAA for FY2020 adds provisions for the VA/DoD Interagency Program Office (now known as the Federal EHRM [FEHRM] Program Office) to develop and implement a comprehensive interoperability strategy and to accelerate the exchange of healthcare information to support delivery of care by both VA and DoD. ⁴⁹ To enhance the benefits of EHRM, provide seamless care across both organizations, and leverage data integration, VA and DoD must coordinate to achieve interoperability.
<i>VA Maintaining Internal Systems and Strengthening Integrated Outside Networks (MISSION) Act</i>	VA MISSION Act (2018) supports expanding the use of community providers to increase access to healthcare services for Veterans. Access standards defining when a Veteran can elect to receive community care were developed and will be reviewed on a triannual basis. ⁵⁰ Additionally, the act mandates the conduct market assessments to review VA facilities to assess how VA is serving Veterans and submission of recommendations for improvement to the Asset and Infrastructure Review (AIR) Commission. VHA needs to expand its capability to coordinate and monitor quality of care with community providers. VHA also needs to improve interoperability to securely and efficiently receive, store, and integrate data from community providers into the EHR. VHA needs to act on recommendations from the AIR Commission to ensure VA physical and IT infrastructures are appropriate to meet the needs of Veterans.
<i>Foundations for Evidence-Based Policymaking Act of 2018</i>	The act includes new requirements for federal agencies to establish senior leaders for program evaluation and data coordination to help agencies produce and use evidence, strengthens privacy protections for confidential data (Confidential Information Protection and Statistical Efficiency Act of 2018), and directs government to make secure access to data more available to generate evidence (Open, Public, Electronic, and Necessary [OPEN] Government Data Act). VHA must adhere to provisions relating to confidential information protection and statistical efficiency. VHA is required to maintain data inventories and publish the information so it is accessible to the public.

⁴⁸ Base Year 2017 VA Enrollee Health Care Projection Model, Office of the ADUSH for Policy and Planning, November 2018.

⁴⁹ H.R. 2500, National Defense Authorization Act for Fiscal Year 2020, congress.gov.

⁵⁰ VHA Vision Plan, December 2020, pg. 19.

Category / Driver	Description
<i>21st Century Cures Act</i>	The act, signed in December 2016, mainly focuses on acceleration of research into preventing and curing serious illnesses and development of drugs and medical devices. However, it also includes provisions to improve HIT, including promoting nationwide interoperability among disparate EHRs and guarding against information blocking. VHA has been involved in development of a Trusted Exchange Framework that creates a common set of rules for information exchange. VHA must not take any action that may inhibit the appropriate exchange, access, and use of electronic health information.
5. VHA Performance Gaps / Improvement Opportunities	Areas where it is critical for VHA to improve its clinical or business performance, as identified through assessment of performance measures, product effectiveness analyses, external and internal inspection, Lean-based continuous improvement projects, and innovation efforts.
<i>Focus on use of SMART performance measurements</i>	VHA HIT solutions will be impacted by efforts to develop SMART (Specific, Measurable, Attainable, Relevant, and Time-Bound) performance measures and a measurement system. VHA needs to develop SMART performance measures with substantial clinical credibility and new HIT systems should include the capability to capture data, analyze, and report on performance measures.
<i>Data weaknesses</i>	VHA's legacy systems have a multitude of data weaknesses. Maintenance of key enterprise data is widely disparate and inefficient. This limits the ability to link and aggregate data, creates data security challenges, and hampers interoperability, reusability, and data sharing. VHA must invest in data quality improvement and data standardization, such as FHIR and APIs, to support enhanced analysis, reporting, and intelligent decision support at both the enterprise and field level.
<i>Integrated planning</i>	There is a need to improve collaboration between VHA and OIT and develop integrated strategic, capital, and IT plans. VHA needs to work collaboratively with OIT to streamline the IT investment decision-making process and ensure the success of IT projects. It needs to synchronize approved VHA capital projects with OIT investment plans to secure necessary IT funding. This will maximize business value and coordinate efforts to better utilize scarce budget and human resources.
<i>Data tracking for clinical trainees</i>	VHA does not have a single database that captures essential data on the 120,000 trainees per year that present at VAMCs for clinical training, all of whom are appointed under Title-38 Appointment Authority. VHA needs to standardize the appointment, on/off boarding, collection of data, and tracking of clinical trainees across the VHA.
<i>Health research</i>	VHA research programs discover new knowledge in healthcare, which leads to improved outcomes and lower costs, and facilitates the translation of cutting-edge research into operations. However, VHA cannot currently share research information electronically with the public or other research entities. VHA needs to invest in HIT solutions to improve data storage, security, and automation to support management of research trials, data management, and public access to research data.
<i>Business enabling services</i>	VA/VHA must maintain and continuously update non-clinical services that support clinical operations. VA/VHA needs to improve efficiency of enabling services to compete with modern, more streamlined systems. This includes non-clinical services that help maintain VHA operations such as supply chain, financial management, logistics, human resources, etc.

APPENDIX B – ACRONYM GLOSSARY

Acronym	Definition
ABAC	Attribute-Based Access Control
AI	Artificial Intelligence
API	Application Programming Interface
CDS	Clinical Decision Support
COTS	Commercial-off-the Shelf
CPRS	Computerized Patient Record System
DoD	Department of Defense
DMLSS	Defense Medical Logistics Standard Support
EHR	Electronic Health Record
EHRM	Electronic Health Record Modernization
FEHRM	Federal Electronic Health Record Modernization Program Office
FHIR	Fast Healthcare Interoperability Resources
FMBT	Financial Management Business Transformation
FY	Fiscal Year
GB	Governance Board
HIT	Health Information Technology
HISP	Health Information Strategic Plan
HL7	Health Level Seven
HPIDN	High-Performing Integrated Delivery Network
HRO	High Reliability Organization
ICD-10	International Statistical Classification of Diseases and Related Health Problems (10 th Revision)
iFAMS	Integrated Financial Acquisition Management System
IoT	Internet of Things
IT	Information Technology
ITC	IT Committee
ITSSC	IT Strategy Sub-Committee
LHS	Learning Health System
MISSION Act	Maintaining Internal Systems and Strengthening Integrated Outside Networks Act
ML	Machine Learning
M2M	Machine to Machine
NDAA	National Defense Authorization Act
OEHRM	Office of Electronic Health Record Modernization
OHI	Office of Health Informatics
OIT	Office of Information and Technology
ONC	Office of the National Coordinator for Health IT
PPBE	Planning, Programming, Budgeting and Execution
RPA	Robotic Process Automation
SaaS	Software as a Service
SMART	Specific, Measurable, Attainable, Relevant, and Time-Bound
SNOMED	Systematized Nomenclature of Medicine
USH	Undersecretary of Health
VA	Department of Veterans Affairs
VALOR	Veterans Affairs Logistics Redesign
VAMC	VA Medical Center
VHA	Veterans Health Administration
VistA	Veterans Health Information Systems and Technology Architecture
VISN	Veterans Integrated Service Networks